

REVISIONS																			
LTR	DESCRIPTION										DATE (YR-MO-DA)				APPROVED				
A	Add vendor CAGE 27014. Add case outline I (metal can). Add terminal connections for case H. Delete testing for $R_{OUT}$ , $V_N$ , $C_{IN}$ , $B_{W1}$ , $B_{W2}$ , $B_{W3}$ , $t_{PD-1}$ , $t_{PD-3}$ , $t_{R-1}$ , $t_{R-3}$ . Editorial changes throughout										86-05-12				M. A. Frye				
B	Add vendor CAGE 18324. Add device 02, generic part number 592. Delete vendor CAGE 27014 for device 01IX. Change to military drawing format. Make changes to table I. Editorial changes throughout. Delete vendor CAGE 01295 for device 01IX. Inactivate device 01HX for new design.										89-05-09				M. A. Frye				
C	Add device 03 for generic part number TL027. Add outline letter 2. Make changes to $t_{PD}$ and $t_{R2}$ . Inactivate device types 02HX and 02IX for new design.										93-11-30				M. A. Frye				
REV																			
SHEET																			
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REV STATUS OF SHEETS				REV		C	C	C	C	C	C	C	C						
				SHEET		1	2	3	4	5	6	7	8	9					
PMIC N/A				PREPARED BY RICK C. OFFICER						DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444									
<b>STANDARDIZED MILITARY DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A				CHECKED BY RAY MONNIN						<b>MICROCIRCUIT, LINEAR, TWO-STAGE DIFERENTIAL VIDEO AMPLIFIER, MONOLITHIC SILICON</b>									
				APPROVED BY MICHAEL A. FRYE															
				DRAWING APPROVAL DATE 85-10-04						SIZE <b>A</b>	CAGE CODE <b>67268</b>	<b>84185</b>							
				REVISION LEVEL  C						SHEET 1 OF 9									

## 1. SCOPE

1.1 Scope. This drawing describes the device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device types. The device types shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit</u>
01	733	Two-stage, differential input, differential output Video
02	592	Two-stage, differential input, differential output Video
03	TL027	Two-stage, differential input, differential output Video

1.2.2 Case outlines. The case outline(s) shall be as designated in appendix C of MIL-STD-1835, and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
H	GDFP1-F10 or CDFP2-F10	10	Flat pack
I	MACY1-X10	10	Can
2	CQCC1-N20	20	Square leadless chip carrier

1.2.3 Lead finish. The lead finish shall be as specified in MIL-M-38510. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

## 1.3 Absolute maximum ratings.

Positive supply voltage (V <sub>+</sub> )	-----	+8 V dc
Negative supply voltage (V <sub>-</sub> )	-----	-8 V dc
Differential input voltage	-----	±5 V dc
Common mode input voltage	-----	±6 V dc
Output current	-----	10 mA
Maximum power dissipation (P <sub>D</sub> )	-----	500 mW <sup>1/</sup>
Junction temperature (T <sub>J</sub> )	-----	+150° C
Storage temperature range	-----	-65° C to +150° C
Operating temperature range	-----	-55° C to +125° C
Lead temperature (soldering, 60 seconds)	-----	+300° C
Thermal resistance, junction-to-case (θ <sub>JC</sub> )	-----	See MIL-M-38510, appendix C

## 1.4 Recommended operating conditions.

Ambient operating temperature range (T<sub>A</sub>) ----- -55° C to +125° C

<sup>1/</sup> With T<sub>A</sub> above +105° C, derate linearly 11mW/° C for cases C and 2. With T<sub>A</sub> above +57° C, derate linearly 5.5 mW/° C for case H. With T<sub>A</sub> above +75° C, derate linearly 6.5mW/° C for case I.

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## 2. APPLICABLE DOCUMENTS

2.1 Government specification and standards, and bulletin. Unless otherwise specified, the following specification, standards, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

### SPECIFICATION

#### MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

### STANDARDS

#### MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.  
MIL-STD-1835 - Microcircuit Case Outlines.

### BULLETIN

#### MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's)

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

## 3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Case outlines. The case outlines shall be in accordance with 1.2.2.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and apply over the full ambient operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> -55°C ≤ T <sub>A</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input voltage range	V <sub>IN</sub>		1, 2, 3	All	±1.0		V
Input offset current	I <sub>IO</sub>		1	01, 02		3	μA
			2, 3			5	
			1	03		5	
			2, 3			6	
Input bias current	I <sub>IB</sub>		1	01, 03		30	μA
				02		20	
			2, 3	All		40	
Input resistance	R <sub>IN2</sub>	<u>2/ 3/</u>	1	01, 02	20		kΩ
			2, 3		8		
			1	03	10		
			2, 3		8		
Output offset voltage	V <sub>001</sub>	R <sub>L</sub> = ∞ <u>4/</u>	1, 2, 3	All		2.0	V
	V <sub>002</sub>	R <sub>L</sub> = ∞ <u>2/</u>	1	01, 02		1.0	
			2, 3			1.2	
			1	03		0.7 5	
			2, 3			1.5	
	V <sub>003</sub>	R <sub>L</sub> = ∞ <u>5/</u>	1	01		1.0	
			2, 3			1.2	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output common mode voltage	$V_{\text{OCM}}$	$R_L = \infty, T_A = +25^{\circ}\text{C}$	1	01, 02		3.4	V
				03		4.25	
Change in output common mode voltage	$\Delta V_{\text{OCM}}$	$R_L = \infty, T_A = +25^{\circ}\text{C},$ $V_{\text{AGC}} = 0\text{ V to } 2\text{ V}$	1	03		300	mV
Open circuit voltage at REF OUT	$V_{\text{REF}}$	$I_{\text{REF}} = 1\text{ mA to } 100\text{ }\mu\text{A},$ $T_A = +25^{\circ}\text{C}$	1	03	1.3	1.5	$\mu\text{A}$
Output sink current	$I_{\text{SINK}}$		1	01, 02	2.5		mA
			2, 3		2.2		
			1	03	3		
			2, 3		2.8		
Supply current	$I_{\text{CC}}$		1	01, 02		24	mA
			2, 3			27	
			1	01		27	
			2, 3			30	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Differential voltage gain	$A_{V1}$	$V_{OUT} = 3.0 V_{P-P}$ , <u>4</u> / $R_L = 2 \text{ k}\Omega$ , $T_A = +25^{\circ}\text{C}$	4	01	300	500	V
			5, 6		200	600	
			4	02	300	500	
			5, 6		200	600	
			4	03	200	400	
			5, 6		150	450	
	$A_{V2}$	$V_{OUT} = 3.0 V_{P-P}$ , <u>2</u> / $R_L = 2 \text{ k}\Omega$ , $T_A = +25^{\circ}\text{C}$	4	01	90	110	
			5, 6		80	120	
			4	02	90	110	
			5, 6		80	120	
			4	03	65	105	
			5, 6		55	115	
	$A_{V3}$	$V_{OUT} = 3.0 V_{P-P}$ , <u>5</u> / $R_L = 2 \text{ k}\Omega$ , $T_A = +25^{\circ}\text{C}$	4	01	9	11	
			5, 6		8	12	
Propagation delay	$t_{pd}$	$V_{OUT} = 1 V_{P-P}$ , <u>2</u> / <u>3</u> / $T_A = +25^{\circ}\text{C}$	9	All		10	ns
Rise time	$t_{r2}$	$V_{OUT} = 1 V_{P-P}$ , <u>2</u> / <u>3</u> / $T_A = +25^{\circ}\text{C}$	9	01, 02		10	ns
				03		12	

1/  $V_S = \pm 6.0 \text{ V}$ .2/ If not tested, shall be guaranteed to the specified limits.3/ GAIN ADJ 1A and GAIN ADJ 1B connected together. Gain = 400.4/ GAIN ADJ 2A and GAIN ADJ 2B connected together. Gain = 100.5/ All gain pins open. Gain = 10.

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Device types	01 and 02	03	01 and 02	01 and 02	01 and 02	03
Case outlines	C		H	I	2	
Terminal number	Terminal symbol					
1	INPUT+	INPUT+	INPUT-	INPUT-	NC	NC
2	NC	AGC	GAIN ADJ 2A	INPUT+	INPUT+	INPUT+
3	GAIN ADJ 2A	GAIN ADJ 1A	GAIN ADJ 1A	GAIN ADJ 2A	NC	AGC
4	GAIN ADJ 1A	GAIN ADJ 2A	-V <sub>CC</sub>	GAIN ADJ 1A	GAIN ADJ 2A	GAIN ADJ 1A
5	-V <sub>CC</sub>	-V <sub>CC</sub>	OUTPUT+	-V <sub>CC</sub>	NC	NC
6	NC	NC	OUTPUT-	OUTPUT+	GAIN ADJ 1A	GAIN ADJ 2A
7	OUTPUT+	OUTPUT+	+V <sub>CC</sub>	OUTPUT-	NC	NC
8	OUTPUT-	OUTPUT-	GAIN ADJ 1B	+V <sub>CC</sub>	-V <sub>CC</sub>	-V <sub>CC</sub>
9	NC	NC	GAIN ADJ 2B	GAIN ADJ 1B	NC	NC
10	+V <sub>CC</sub>	+V <sub>CC</sub>	-INPUT	GAIN ADJ 2B	OUTPUT+	OUTPUT+
11	GAIN ADJ 1B	GAIN ADJ 2B	---	---	NC	NC
12	GAIN ADJ 2B	GAIN ADJ 1B	---	---	OUTPUT-	OUTPUT-
13	NC	REF OUT	---	---	NC	NC
14	INPUT-	INPUT-	---	---	+V <sub>CC</sub>	+V <sub>CC</sub>
15	---	---	---	---	NC	NC
16	---	---	---	---	GAIN ADJ 1B	GAIN ADJ 2B
17	---	---	---	---	NC	NC
18	---	---	---	---	GAIN ADJ 2B	GAIN ADJ 1B
19	---	---	---	---	NC	REF OUT
20	---	---	---	---	INPUT-	INPUT-

NC = No connection

FIGURE 1. Terminal connections.

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3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-EC shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biasese, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(2)  $T_A = +125^{\circ}\text{C}$ , minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

##### 4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 7, 8, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

##### 4.3.2 Groups C and D inspections.

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883:

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biasese, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(2)  $T_A = +125^{\circ}\text{C}$ , minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with method 5005, table I)
Interim electrical parameters (method 5004)	
Final electrical test parameters (method 5004)	1*, 2, 3, 4
Group A test requirements (method 5005)	1, 2, 3, 4, 5, 6, 9**
Group C and D end-point electrical parameters (method 5005)	1

\* PDA applies to subgroup 1.

\*\* Subgroups 9, if not tested, shall be guaranteed to the limits specified in table I.

## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

## 6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for original equipment manufacturer application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444-5270, or telephone (513) 296-5377.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-EC.

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